

We claim:

1. A device for controlled exposure of photoreactive compositions, the device comprising:

5 an apparatus for retaining a photosensitive substrate containing a photoreactive composition;  
a light emitting diode array containing a plurality of light emitting diodes; and  
a control mechanism for regulating the intensity and distribution of light emitted from the light emitting diode array;  
wherein the light emitting diodes are configured and arranged for controlled  
10 exposure of the photoreactive composition.

2. The device for controlled exposure of photoreactive compositions of claim 1, wherein the light emitting diodes have emission spectra below 450 nanometers.

15 3. The device for controlled exposure of photoreactive compositions of claim 1, wherein greater than 80 percent of the emission spectra of the light emitting diodes is from 350 to 400 nanometers.

4. The device for controlled exposure of photoreactive compositions of claim 1,  
20 wherein the array of light emitting diodes emits light at a plurality of wavelengths from 390 to 450 nm.

5. The device for controlled exposure of photoreactive compositions of claim 1, wherein the array of light emitting diodes comprises at least two light emitting diodes.

25

6. The device for controlled exposure of photoreactive compositions of claim 1, further comprising a light guide for directing light from the array of light emitting diodes to the photosensitive substrate.

5 7. The device for controlled exposure of photoreactive compositions of claim 7, wherein the light guide comprises a plurality of optic fibers.

8. The device for controlled exposure of photoreactive compositions of claim 1, wherein the plurality of optic fibers comprises asymmetric fibers.

10

9. The device for controlled exposure of photoreactive compositions of claim 8, further comprising a photoresist laminate containing photosensitive compositions sensitive to a plurality of wavelengths of light.

15 10. The device for controlled exposure of photoreactive compositions of claim 1, wherein the photoreactive composition comprises a photoreactive resin.

11. A method of exposing a substrate containing a photoreactive composition, the method comprising:

20 providing a light emitting device for controlled exposure of photoreactive compositions, the device comprising an apparatus for retaining a photosensitive substrate containing a photoreactive composition; a light emitting diode array containing a plurality of light emitting diodes; and a control mechanism for regulating the intensity and distribution of light emitted from the light emitting diode array; wherein the light  
25 emitting diodes are configured and arranged for controlled exposure of the photoreactive composition;

providing a substrate containing a photoreactive composition; and

exposing the photoresist substrate with light from the light emitting device.

12. The method of exposing a substrate of claim 11, wherein the light emitting diodes have an emission spectra of 350 to 450 nanometers.

5

13. The method of exposing a substrate of claim 11, wherein greater than 80 percent of the emission spectra of the light emitting diodes is from 350 to 450 nanometers.

14. The method of exposing a substrate of claim 11, wherein the array of light  
10 emitting diodes emits light at a plurality of wavelengths from 370 to 430 nanometers.

15. The method of exposing a substrate of claim 14, wherein the array of light emitting diodes comprises diodes that each emit light that is at more than one discrete wavelength band.

15

16. The method of exposing a substrate of claim 11, further comprising a light guide for directing light from the array of light emitting diodes to the photosensitive substrate.

17. The method of exposing a substrate of claim 11, wherein the light guide  
20 comprises a plurality of optic fibers.

18. The method of exposing a substrate of claim 12, wherein the plurality of optic fibers comprises asymmetric fibers.

19. The method of exposing a substrate of claim 11, further comprising a photoresist  
25 laminate containing photosensitive compositions sensitive to a plurality of wavelengths of light.

20. The method of exposing a substrate of claim 11, wherein the photoreactive composition comprises a photoreactive resin.